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ABSTRACT

A study investigated the effects of strategy instruction on the reading and writing abilities of sixth-grade middle-school students with delayed literacy. An experimental group of 10 sixth-grade, English-speaking inner-city students in the midwestern United States was matched on race, gender, and reading comprehension test scores with 10 sixth-grade control students. All students were at least two years behind in their literacy skills. Students in the experimental group engaged in strategic reading and writing instruction for 2 hours daily for 14 weeks. Results of structured performance-based student interviews in reading and writing showed that the short-term instructional intervention in strategy instruction not only improved students literacy performance but also extended and enhanced their models of literacy. (Contains 10 references, and one table and two figures of data.) (RS)

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CHANGING MIDDLE SCHOOL STUDENTS' MODELS OF LITERACY THROUGH COGNITIVE STRATEGY INSTRUCTION

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Center for the Study of Reading

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Abstract

A study was conducted to investigate the effects of strategy instruction on the reading and writing abilities of sixth-grade students with delayed literacy. Results of structured performance-based student interviews in reading and writing showed that the short-term instructional intervention in strategy instruction not only improved the students' literacy performance but also extended and enhanced their models of literacy.

CHANGING MIDDLE SCHOOL STUDENTS' MODELS OF LITERACY THROUGH COGNITIVE STRATEGY INSTRUCTION

The study we describe in this report examined the effects of strategy instruction on the reading and writing abilities of middle school students with delayed literacy. The goal of the study was to investigate whether participating in strategic, problem-centered learning could enhance the students' literacy performance and their mental models of reading and writing processes.

Anderson (1992) and Anderson and Roit (1993a) studied the effectiveness of instruction designed to encourage strategic reasoning in reading-delayed adolescents. Their results showed significant gains for the students on both standardized tests and, more importantly, on in-depth analyses of videotaped teaching/learning sessions. The present study extended that work by using instruction to relate reading to writing in strategic ways. In addition, the study employed a structured, performance-based student interview to measure changes in students' literacy performance and in their mental models of literacy.

For over a decade, reading strategy instruction has been well represented in the literature (for a review, see Pearson & Dole, 1987). The instruction used in this study included the most effective aspects of strategy instruction: group collaboration, opportunistic teaching, reading and writing as problem solving, flexible strategy use, and, uniquely, the accessing and self-evaluation of adolescents' existing strategies. A key idea underlying the instruction is its emphasis on helping students approach reading and writing not as work to finish but as learning processes that require problem-solving effort (Anderson & Roit, 1993b). The need to focus on reading and writing as learning processes rather than as task completion is especially important for poor readers who have been described as passive, teacher dependent (Klein, 1989), and eager to get assignments done without considering learning (Anderson, 1984). Such students may perceive their literacy problems as a disgrace, and thus may be reluctant to use their natural problem-solving abilities when they read and write.

An integral part of the instruction was the sharing of problems and strategies by teachers and students. The reading instruction was carried out with small, collaborative groups of students who had various reading problems and strengths. There was a positive focus on revealing and treating problems as objects of inquiry to be resolved strategically by the group. Thus, reading was viewed as a problem-solving process in which one did not evade problems but learned from them. This encouraged students to approach more challenging texts and to continually upgrade text difficulty without resistance.

In addition, reading instruction was integrated with writing instruction. Learning how to understand text was followed by text analysis in which students determined the kinds of information and the feelings engendered by the text. Their analyses were used to generate procedural facilitators (Bereiter & Scardamalia, 1987) to aid them in their writing. For example, after reading a text that focused on a problem, students noted that the text stated a problem, gave a cause for it, predicted consequences of it, provided solutions for the problem, and so forth. Students used these categories of information to access their own ideas for writing.

Writing instruction focused primarily on process writing (Graves, 1983). However, because knowledge of the stages that writers go through does little to reveal the strategies that writers use at each stage (Bereiter & Scardamalia, 1987), we enhanced process writing by including specific strategies at each stage, such as generation of facilitators, concentration on a topic, and self-questioning.

Method

Students

The study was conducted in an inner-city middle school located in a city in the midwestern United States. An experimental group of 10 sixth-grade, English-speaking students was matched on race, gender, and reading comprehension test scores with 10 sixth-grade control group students. All students were at least two years behind in their literacy skills, according to teacher judgments and standardized test scores. As a result of attrition, data from only 17 (10 experimental, 7 control) students were included in the analysis.

Instructional Procedure

Students in the experimental group, divided into two subgroups of 5 each, engaged in strategic reading and writing instruction for 2 hours daily for 14 weeks. The teaching was carried out either by project staff members (one for each subgroup) or by two teachers from the school who received training during the course of the study. Students read and wrote every day. Reading materials (provided by the project) were high-quality, authentic, challenging, and primarily informational texts that were organized into units (e.g., biography, oral history, problem solving, comparisons). Control group students took part in their regular reading and language arts classes every day over the same time period. They did not receive strategic reading or process writing instruction.

Data Collection

Data for the students were collected from standardized test scores and student interviews.

Standardized testing. The Stanford Reading Achievement Test (SAT) was administered by the school to every sixth-grade student at the beginning and end of the year. We were particularly interested in the reading comprehension subtest of the SAT, because comprehension was the focus of the intervention. The school provided us with the scores for the students in the study.

Student interviews. Each student participated in structured, performance-based pre- and posttest interviews so that we could assess their understanding of literacy processes over time. Separate interviews, lasting approximately 30 minutes each, were conducted for reading and writing.

In the reading interview, students first were asked a number of questions to assess their models of reading. Three pairs of questions were included, but one in each pair proved more sensitive in tapping students' responses. Thus, analyses were conducted on three questions: (a) What do you like best about reading? (b) What do you find most difficult about reading? (c) What do you think good readers do when they read? Next the interviewer and student took turns reading paragraphs of a challenging informational text. Two counterbalanced texts were used, one on mummies and one on sharks. To assess understanding after the reading, each student was asked to summarize the text and to tell what the text made him or her wonder about.

The writing interview, held two days later, began with questions that paralleled the reading questions. Then students wrote a text related to the topic they had read about earlier and were asked questions related to writing and revision.

Results

Standardized Testing

On the reading comprehension subtest of the SAT, the mean grade-equivalent scores increased from 4.29 to 5.14 for experimental students and from 4.11 to 4.13 for control students from pre- to posttest. A repeated measures analysis on the scores showed a significant group-by occasion effect, favoring the experimental students, F (1,15) = 6.54, p < .O5. A similar effect was obtained with percentile scores, indicating that the experimental group made significantly greater gains in reading comprehension than did the control group.

Student Prereading Interview Questions and Models of Reading

To analyze the prereading questions on the interview, we employed an approach that has been used for characterizing students' conceptions in learning (Chan, Burtis, Scardamalia, & Bereiter, 1992). All responses were rated on a 6-point scale (0-5), which varies on a continuum from a task-completion model of reading, in which the student sees the goal as "getting it done," to a problem-centered model of reading, in which the student's goal is to put forth whatever problem-solving effort is needed to insure meaning, understanding, and learning. Table 1 shows descriptions of the rating-scale levels and examples of students' comments (in italics) for parallel questions in reading and writing.

[Insert Table 1 about here.]

Two raters were trained to conduct blind, independent ratings on the statements. The second rater coded half of the students' responses (290 statements), with a resulting interrater reliability of 83%. If there was more than one response, each was coded separately. To control for variation in verbal production across students, a mean score was obtained on the total score, averaged across number of responses. Ratings of the three questions were pooled to construct a composite rating for each student. The mean scores changed from 2.6 to 3.78 for experimental and 3.0 to 2.8 for control students from pre- to posttest. A repeated measures analysis showed a highly significant group-by-occasion effect, F (1,15) = 16.6, p < .01, favoring the experimental group.

It is important to note that students in the experimental group showed reductions in low-level task completion responses (ratings 0-3) and increases in high-level problem-centered responses (ratings 4-5). Figure 1 shows the frequency of low-level versus high-level responses. A repeated measures analysis on the frequency of problem-centered scores showed that the experimental students made significantly more gains than controls, F (1.15) = 11.1, p < .01. These results demonstrate that only the experimental students made significant shifts toward viewing reading as a problem-solving process, thus gaining a more sophisticated model of reading through collaborative strategy instruction.

[Insert Figure 1 about here.]

Student Prewriting Interview Questions and Models of Writing

Results were similar but not as strong for the prewriting interview questions. The mean scores on the ratings changed from 2.9 to 3.8 for experimental and 2.9 to 2.8 for control students from pre- to posttest. A repeated measures analysis on students' overall writing scores showed a less but still significant group-by-occasion effect, F (1,15) = 4.31, p < .05. Figure 2 shows the proportion of task-completion and problem-centered responses for each group on the questions. A repeated measure analysis on the frequency of problem-centered responses approached significance, F (1,15) = 3.79, p < .07.

[Insert Figure 2 about here.]

Performance-based Reading and Writing Assessments

The students' reading and writing performance was also assessed during the interviews. These assessments included asking the students orally to summarize the text, to tell what the text made them wonder about, to produce a writing sample, and to suggest revisions for their writing. The results of these assessments follow.

Summarization. Students' verbal summaries of the text were examined for quantity (number of words) and quality (inclusion of important ideas from the passage). Repeated measures analyses showed significant group-by-occasion effects in favor of the experimental group for both number of words, F (1,15) = 5.11, $p < .05$, and relevance of ideas, F (1,15) = 6.83, $p < .05$.

Wondering. Responses for what the students wondered about were classified into reader responses and text-related wondering questions. A 6-point scale was devised to conduct blind ratings on the complexity of responses. This included reader responses that varied from comments that were unrelated to text to reasoned text evaluations, and wonderings that varied from irrelevant questions to knowledge-construction questions that sprang from the text but required further outside information. A repeated measure showed no significant differences between experimental students and control students, but there was a trend toward the experimental students asking more and better questions. The lack of significant differences might have been predicted simply because both texts used were on highly motivating topics that clearly stimulated reactions and questions from all students.

Written performance. Students' writing samples from the interview were also analyzed for quantity (number of words) and quality (global ratings and specific ratings on purpose, content, organization and mechanics). A quality rating score could total 5 points for a global rating and 20 points for more specific rating, for a maximum of 25 points. Repeated measures showed marginally significant effects in favor of experimental students for both global ratings, F (1,15)= 4.26, $p < .057$, and specific ratings, F (1,15) = 4.28, $p < .056$, on written production.

Revision. Students were asked what they would do to improve their writing samples. Although the differences between experimental and control students on the number of revisions did not reach the significance level on this question, an inspection of the responses suggests that the experimental students tended to recommend more sophisticated revisions (content rather than mechanics revisions) than did controls.

Correlations Between Models of Literacy and Performance

Correlation analyses were conducted to examine the relationship between questions related to literacy models and performance. The results show that gains on the prereading questions were positively correlated with gains in summarization ($r = .54$, $p < .05$) and gains in reading comprehension on the standardized test ($r = .49$, $p < .05$). The results suggest that students' shifts toward a problem-centered model of reading are related to increases in performance.

Discussion

A study was conducted to examine the efficacy of an instructional approach designed to foster students' ability to engage in collaborative problem solving while reading and writing. The findings indicate that such strategy instruction in literacy can enhance this ability. Overall, the experimental students showed more gains than the control group on a standardized test and in reading and writing performance. Student interviews showed that the experimental students also showed shifts toward a more sophisticated model of literacy that involved the need for strategic, problem-solving effort.

The study involved a small number of participants. Although this would seem to result in a lack of power, the statistically significant effects on most measures and the magnitude of some of the effect sizes suggest that the gains are actually quite substantial. With regard to the generalizability of the study, the results are consistent with positive findings on other analyses carried out in earlier studies (Anderson, 1992; Anderson & Roit, 1993a) with far more participants. Thus, this study provides additional data in support of current theoretical views emphasizing the importance of students' mental models and active roles in learning (e.g., Bereiter & Scardamalia, 1989).

The study examined students' models of reading and writing through structured interviews. Consistent with research on intentional learning that distinguishes how passive and active learners approach learning (Bereiter & Scardamalia, 1989), the pretest interview data from this study show that these students tend to approach reading and writing as work to finish rather than as a process that requires problem-solving effort. Nevertheless, it was found that the experimental students were able to make more substantial shifts toward a problem-centered model than were control students, and that these gains were related to increases in literacy performance.

Gains in writing for the experimental group were substantial, but less so than gains in reading. It might be that the interview was not intensive enough to tap the students' models of writing or not sufficiently connected to actual writing. It is also possible that the reading instruction was stronger because it was better established in the minds of the experimenters, while they were just developing and piloting the writing. It is more likely, however, that students simply could not make as much progress in writing as they did in reading during this short intervention. The initial writing abilities of the students were far weaker than their reading abilities, most of the students could only write a sentence or two when the study began. Throughout the instruction, the experimental students found writing much more difficult than reading. It is possible that this short instructional period was insufficient for more substantial gains in writing. It is also possible that writing taxed the students to the point where they could not move up as readily to a metacognitive and/or model-making level as they could in reading. If so, the writing gains that were attained are particularly impressive.

In sum, the results of this study indicate that this approach is a powerful one that can do much to help young adolescents with delayed literacy both in terms of improving their reading and writing and in improving their mental models of these processes.

We are currently conducting a three-year teacher development study to test the effects of more extensive strategy instruction in reading and writing. This study involves many more adolescents at several grade levels.

Author Note

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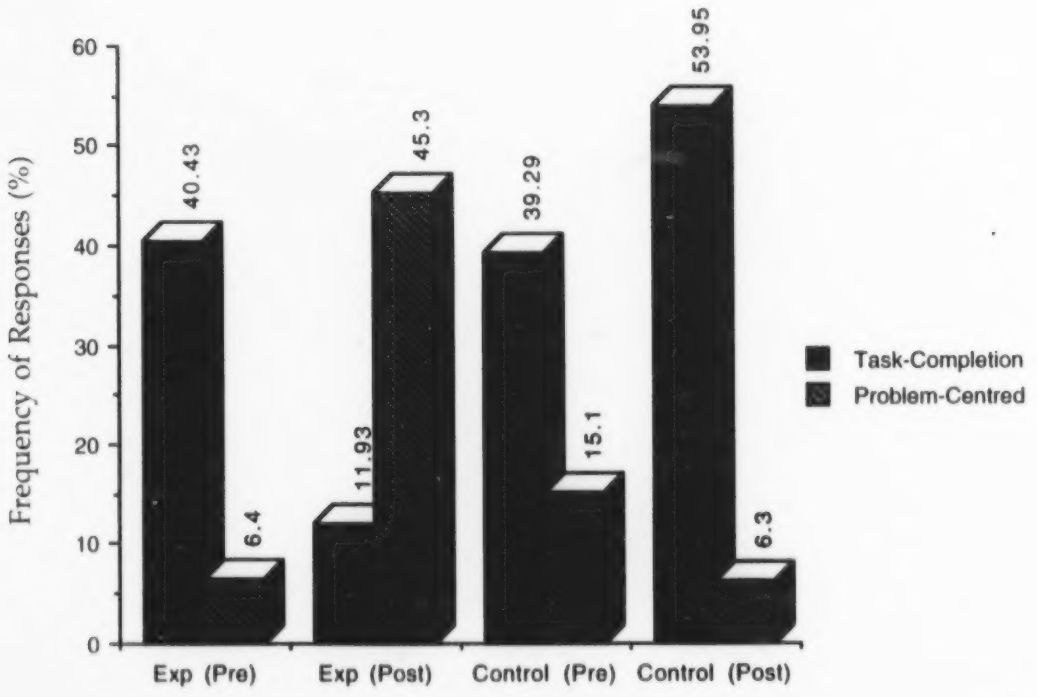
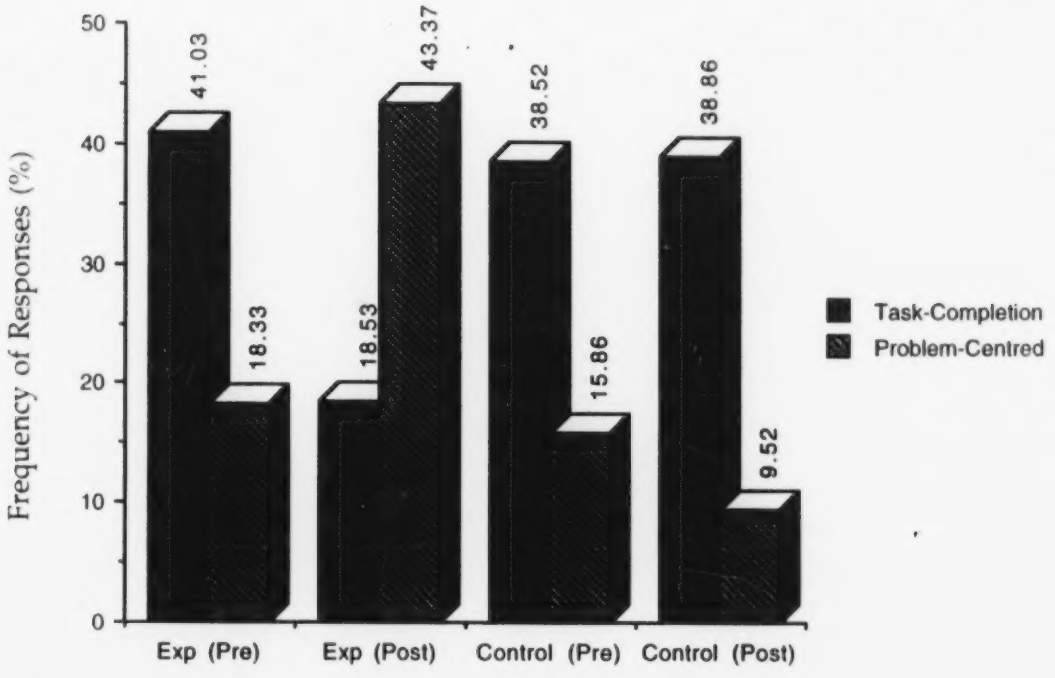
Table 1
Ratings and Student Examples for Prereading and Prewriting Interview Questions

What do you like best about reading/writing?	What do you find most difficult about reading/writing?	What do good readers/writers do when they read/write?
Level 0: No response		
Level 1: Unelaborated response, focus on behavioral factors		
It's just fun.	*Others laugh at me.*	*They don't talk to neighbors.*
Level 2: Task completion, focus on literacy as school tasks		
Getting good grades. *When I copy correct answers.*	*Doing workbook stuff.* *When I write a long report.*	*It's always perfect.* *They know the answers.*
Level 3: Student-based focus on simple aspects of literacy: limited topics, word level difficulties, the importance of practice and carefulness		
I only like to read if it's about sports. *I like to write on some topics.*	*Big words.* *I stumble on words.* *I can't spell the words.*	*They take their time.* *They practice a lot.* *They write carefully.*
Level 4: Student-based focus on more complex aspects of literacy: usefulness, understanding the text, and knowing what to write		
It is good for you because you can understand life things. *If I read a sports book, it teaches new things.*	*You can't really get anything out of it if you don't understand.* *When I have to choose the topic.* *Thinking about what to write.*	*They try to understand what they are reading.* *They think about what they are going to write.*
Level 5: Problem-centered focus in which literacy is viewed as a problem solving process		
I like to read the hard paragraphs, the ones you have to work hard on. *To reread it and go back and put what I meant in my writing.*	*You have to find the difficult words because you might skip over them.* *When you can't spell a word, you got to sound it out; sometimes it's difficult.*	*If they don't know a word, they go back to see what it does in the sentence.* *They think hard about what to write and don't put just anything.* *They check writing and add things.*



Shifts in Conceptions in Reading

Figure 1



Shifts in Conceptions of Writing

Figure 2